

LANDAU ASSOCIATES, INC.



Phase I  
Final  
Health and Safety Plan

**COLBERT LANDFILL  
REMEDIAL DESIGN/  
REMEDIAL ACTION**

8/7/89

Prepared for  
Spokane County  
Utilities Department

Prepared by  
Landau Associates, Inc.  
P.O. Box 1029  
Edmonds, WA 98020-1029

August 7, 1989



## EMERGENCY FACILITIES AND NUMBERS

**HOSPITAL** - Holy Family Hospital, N. 5633 Lidgerwood St.,  
Spokane, WA 99207  
Emergency: (509) 482-2460

**DIRECTIONS** - Drive to Highway 2 (Highway 2 runs north and south between the Little Spokane River and Chattaroy Road). Drive south on Highway 2 toward Spokane and follow through town (turns into Division St.). Get in the far left lane. Turn left at Central Avenue (at Perkins Restaurant). Drive one block and take a right on Lidgerwood Street. Follow signs to the emergency entrance. See map (Figure 1) on next page for emergency route.

**TELEPHONE** - A telephone will be located onsite in the support zone trailer.

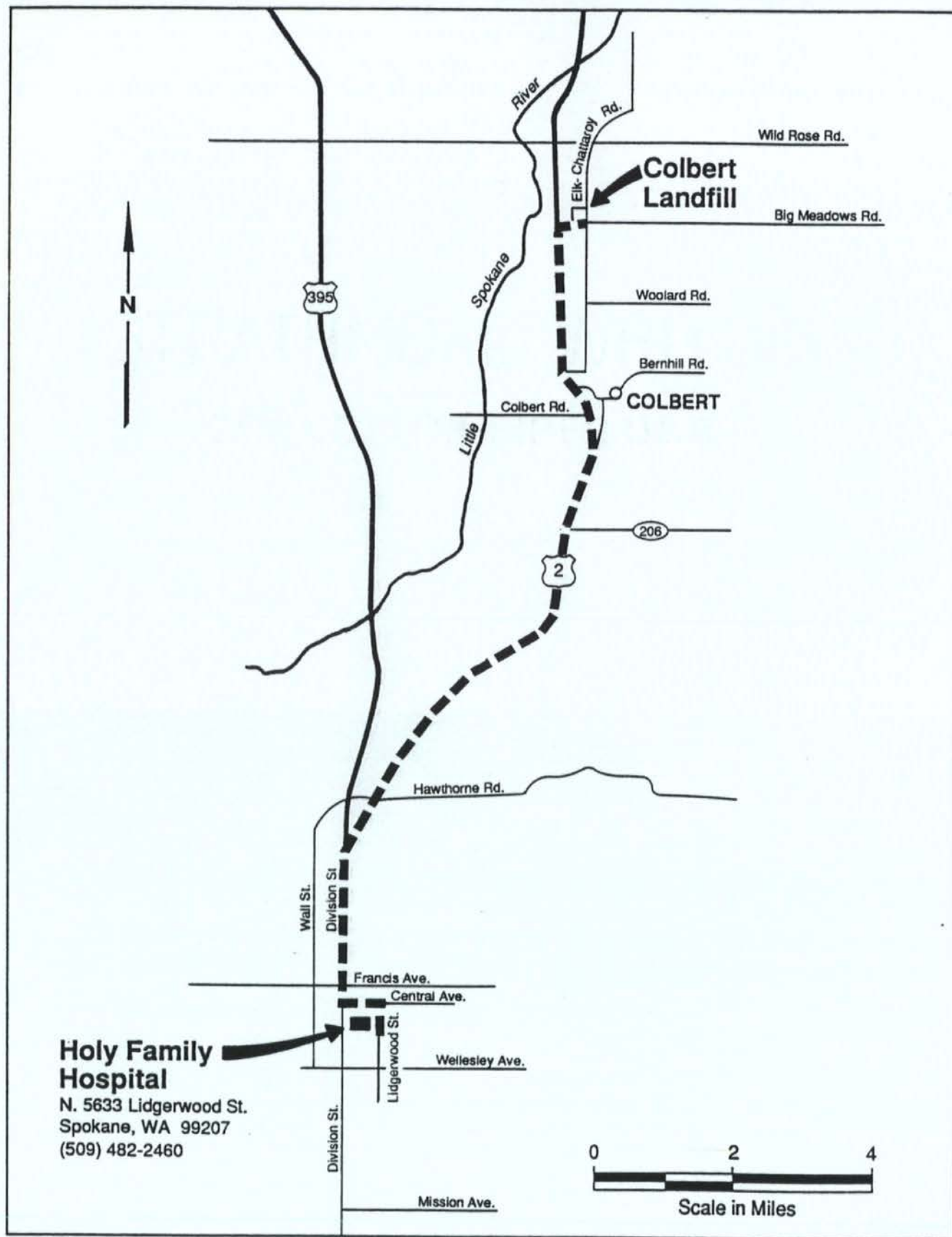
**EMERGENCY TRANSPORTATION SYSTEMS (Fire, Police, Ambulance) - 911**

## EMERGENCY CONTACTS

Fire District #4	(509) 466-9000 or 466-0911
Holy Family Hospital	(509) 482-2460
Spokane Ambulance Service	(509) 328-6161
Sheriff's Desk	(509) 456-2240
Industrial Physician	
Dr. Craig Olsen or Dr. Walker	(509) 747-0770
Washington Department of Ecology	(509) 456-2926
National Response Center	800-424-8802
EPA Region 10	206-442-1263
Chemtrec	800-424-9300
Centers for Disease Control	Day: 404-329-3311
	Night: 404-329-3644

In the event of an emergency, do the following:

1. Call 911 for help as soon as possible. Give the following information:
  - o **WHERE** the emergency is - the Colbert Landfill is located at the northwestern quadrant of the intersection of Elk-Chattaroy, Yale, and Big Meadows Roads.
  - o **PHONE NUMBER** you are calling from
  - o **WHAT HAPPENED** - type of injury
  - o **HOW MANY** persons need help
  - o **WHAT** is being done for the victim(s)
  - o **YOU HANG UP LAST** - let the person you called hang up first
2. If the victim can be moved, transport the individual to the hospital while one person calls the hospital to notify them. If the injury or exposure is not life threatening, decontaminate the individual first. If decontamination is not feasible, wrap the individual in a blanket or sheet of plastic prior to transport.
3. Notify the Safety Officer, the Field Coordinator, and the Project Manager.



**DIRECTIONS:** Drive to Highway 2 (Highway 2 runs north and south between the Little Spokane River and Chattaroy Road). Drive south on Highway 2 toward Spokane and follow through town (turns into Division St.). Get in the far left lane. Turn left at Central Avenue (at Perkins Restaurant). Drive one block and take a right on Lidgerwood Street. Follow signs to the emergency entrance.



**COLBERT LANDFILL  
HEALTH AND SAFETY PLAN**

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## 1.0 INTRODUCTION

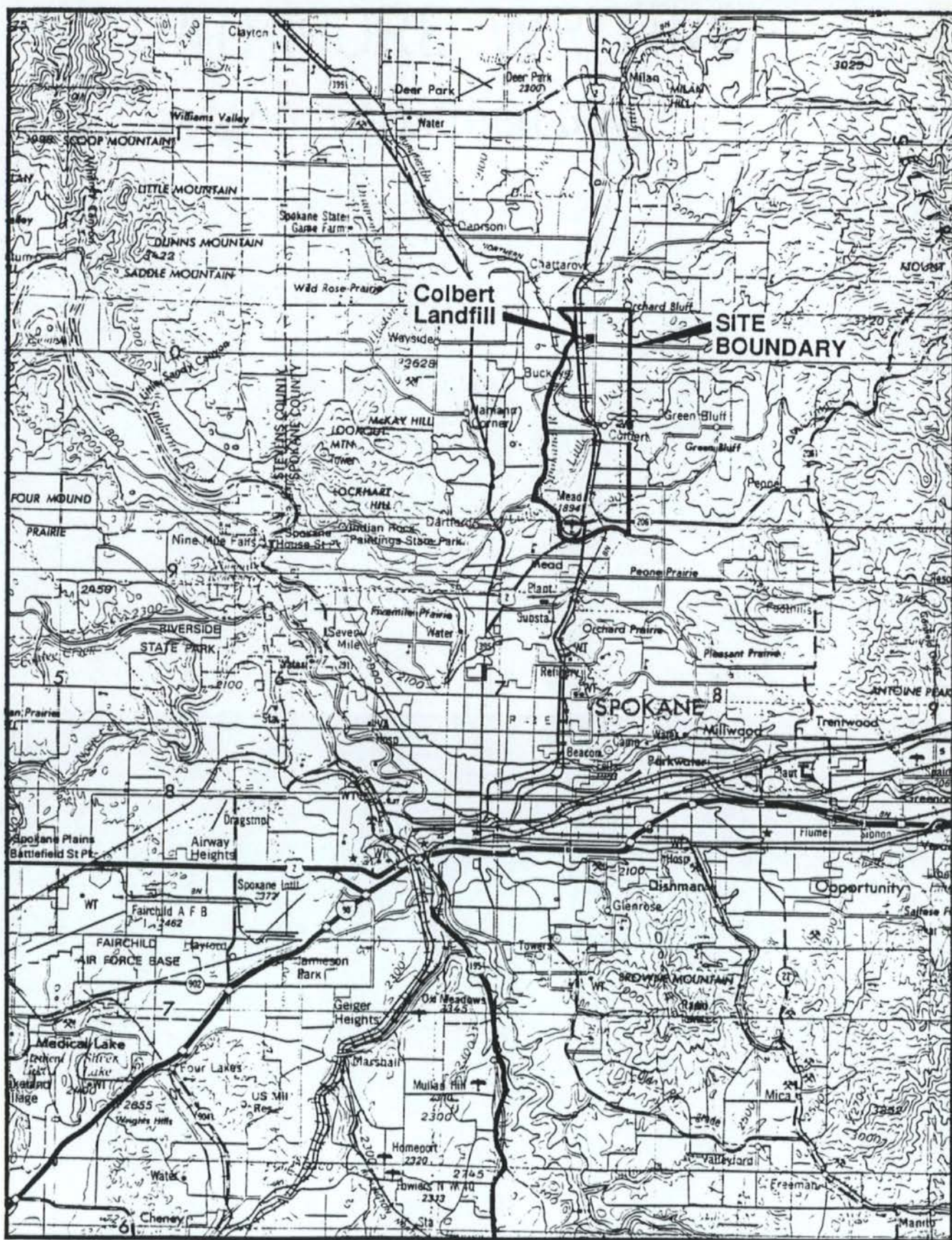
This document presents the Health and Safety Plan for Remedial Design/Remedial Action activities relative to the Colbert Landfill Superfund project. The Health and Safety Plan contains a description of existing site conditions and includes: criteria for hazard and risk evaluation; site organization; air monitoring procedures; descriptions of levels of personal protection and required equipment; decontamination procedures; safety rules and procedures; emergency information; training requirements; and requirements for routine health care and health monitoring.

This Health and Safety Plan has been prepared by Landau Associates, Inc. (Landau), Spokane County's engineering consultant for design of the Colbert Landfill Remedial Action. Landau will implement this plan for all site activities accomplished as part of the Remedial Design (and preliminary remedial action) and will revise this document (if appropriate) for construction of the final Remedial Action.

### 1.1 SITE BACKGROUND

The Colbert Landfill is an inactive 40-acre municipal solid waste landfill located approximately 15 miles north-northeast of the City of Spokane and 2.5 miles north of the Town of Colbert. The landfill location and the site boundary are shown on Figure HS-1.1. A more detailed site description and boundary diagram are provided in Section 1.3.





Source: U.S.G.S. Topographic Map of Spokane, Washington; Idaho; Montana, 1980.

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Regional Location Map of  
Colbert Landfill Site



The Colbert Landfill began operating in 1968 following closure of the old township dump (located just south of the Colbert Landfill). The Colbert Landfill operated until 1986, when it became filled to capacity with municipal and commercial waste.

Ground water emanating from the Colbert Landfill has been shown to be contaminated with chlorinated organic solvents. This contamination has been traced to spent organic solvents disposed of at the landfill during the period of 1975 to 1980. Solvents were disposed of at an average rate of several hundred gallons per month, and primarily consisted of 1,1,1-trichloroethane (TCA) and methylene chloride (MC). Other organic solvents have also been detected in the ground water near the landfill, including trichloroethylene (TCE), tetrachloroethylene (PCE), 1,1-dichloroethylene (DCE), and 1,1-dichloroethane (DCA).

In 1980, nearby residents complained to the Eastern Regional Office of the Washington State Department of Ecology (Ecology) about disposal practices at the landfill. State and County officials, under the lead of the Spokane County Utilities Department, initiated an investigation into complaints of ground water contamination in the area by sampling nearby private wells. The results of this initial investigation indicated that some of these wells were contaminated with TCA and, in August 1983, the U.S. Environmental Protection Agency (EPA) placed the Colbert Landfill on its National Priorities List (NPL).

Several studies of the Site have been conducted since 1980, including the 1985 Remedial Investigation/Feasibility Study (RI/FS, Golder and EnviroSphere 1987). The purpose of the RI/FS was to

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determine the nature and extent of contamination caused by the release of chemicals from the landfill, and to evaluate various remedies. Data collection and site characterization were the primary elements of the RI. The data evaluated and collected in the RI formed the foundation of the FS, which presented, evaluated, and ranked various cleanup options. The remedial action for the Colbert Landfill was selected based on the information contained in the FS. The selected remedial action is described in the EPA's Record of Decision (ROD) (EPA 1987), which was released for public comment in September of 1987.

The ROD summary for the Colbert Landfill provides a detailed discussion of the site history, nature and extent of contamination, community relations activities, and the selected remedial action. The selected remedial action is to intercept the advance of the ground water contaminants by extracting the contaminated water and then treating it to remove the organic solvents.

Subsequent to implementation of the ROD, a Consent Decree (U.S. District Court 1989) was negotiated between the regulatory authorities (EPA and Ecology), Spokane County (County), and the Key Tronic Corporation. By this action, the County agreed to conduct the EPA-selected remedy in accordance with Comprehensive Environmental Response Compensation and Liability Act (CERCLA) requirements. The overall Scope of Work for remedial action to address ground water contamination emanating from the Colbert Landfill is presented in Appendix B of the Consent Decree.

As specified in the Scope of Work, the remedial action will be implemented in two phases. Phase I is designed to better char-

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acterize contaminant distribution and site geohydrology. Following completion of the Phase I investigation, design and construction of Phase II remedial action will be accomplished.

Specific performance criteria are presented in the ROD (Table 1 Performance Standards) and have been further refined in the Scope of Work (Tables I-1, IV-1 and V-1). The Scope of Work specifies the basis for design, the design criteria, and criteria for adjustment and modification of the remedial action should the performance criteria be exceeded during operation.

## 1.2 PROJECT DESCRIPTION

This Health and Safety Plan has been prepared to address Phase I Remedial Design/Remedial Action (RD/RA) activities. These activities include:

- (1) Installation of ground water monitoring wells at 11 to 19 locations. Most wells will be located near the suspected edge of the contaminant plumes, although one or two locations may be within the plumes and just outside of the refuse disposal area;
- (2) Collection of ground water samples from these wells for subsequent laboratory analysis;
- (3) Evaluation of the geohydrologic and water quality data obtained during (1) and (2) to assist in the selection of sizes and locations of the pilot study extraction wells, stripping tower(s), and discharge system(s);
- (4) Installation and operation of the pilot extraction wells, stripping tower(s), and discharge system(s); and



- (5) Evaluation of pilot system(s) performance to formulate the design for the Phase II ground water extraction, treatment, and discharge systems.

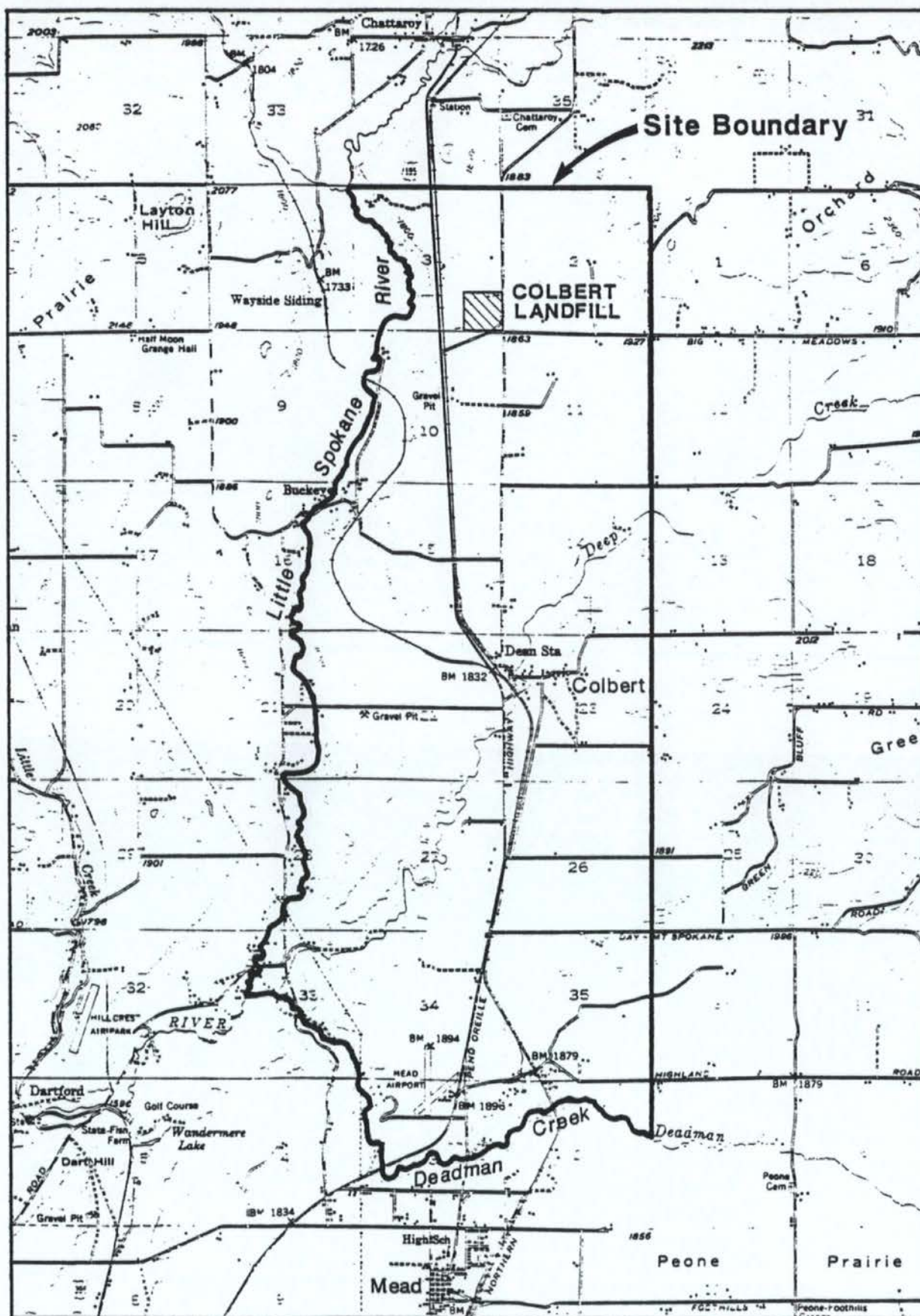
Subsequent to completion of Phase I, this Health and Safety Plan will be revised (if appropriate) to reflect the anticipated Phase II activities.

### 1.3 SITE DESCRIPTION

The ROD defined the area of potential impact surrounding the landfill as the site boundary. The remedial action site (Site) extends north of the landfill about one-half mile, west about one mile to the Little Spokane River, east a similar distance, and south approximately five miles to Peone (or Deadman) Creek, as shown on Figures HS-1.1 and HS-1.2.

The Site for the Colbert Landfill RD/RA is approximately 6,800 acres in area and is entirely within the drainage basin of the Little Spokane River, mainly on a plateau bounded by bluffs down to the river on the west and knobby granite and basalt hills to the east. The area is semi-rural with an estimated population of about 1,500 people within a 3-mile radius of the landfill. There are residences on all sides of the landfill (the closest residences are located to the north and east). Land use is predominantly suburban residential with some agricultural use, mainly farming or livestock production.

Ground water in the area is primarily obtained from the upper and lower aquifers, which have become contaminated by releases from



0 1 2  
Scale in Miles

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Location and Site Boundary Map

HS-1-7

Figure HS-1.2



the landfill. The remedial action is focusing on the extraction and treatment of contaminated ground water from these two aquifers. The approximate extent of ground water contamination is shown on Figures HS-1.3 and HS-1.4 for the upper and lower aquifers, respectively, which covers approximately 1,400 acres. The preliminary locations for the Phase I monitoring and extraction wells are provided on these figures. Additional monitoring wells may be installed.

#### **1.4 HEALTH AND SAFETY PLAN PURPOSE, APPLICABILITY AND ADHERENCE**

This Health and Safety Plan describes specific responsibilities, training, protective equipment, and operating procedures required for Phase I field activities to be accomplished at the Site; modifications, where appropriate, will be made to this plan to address Phase II activities.

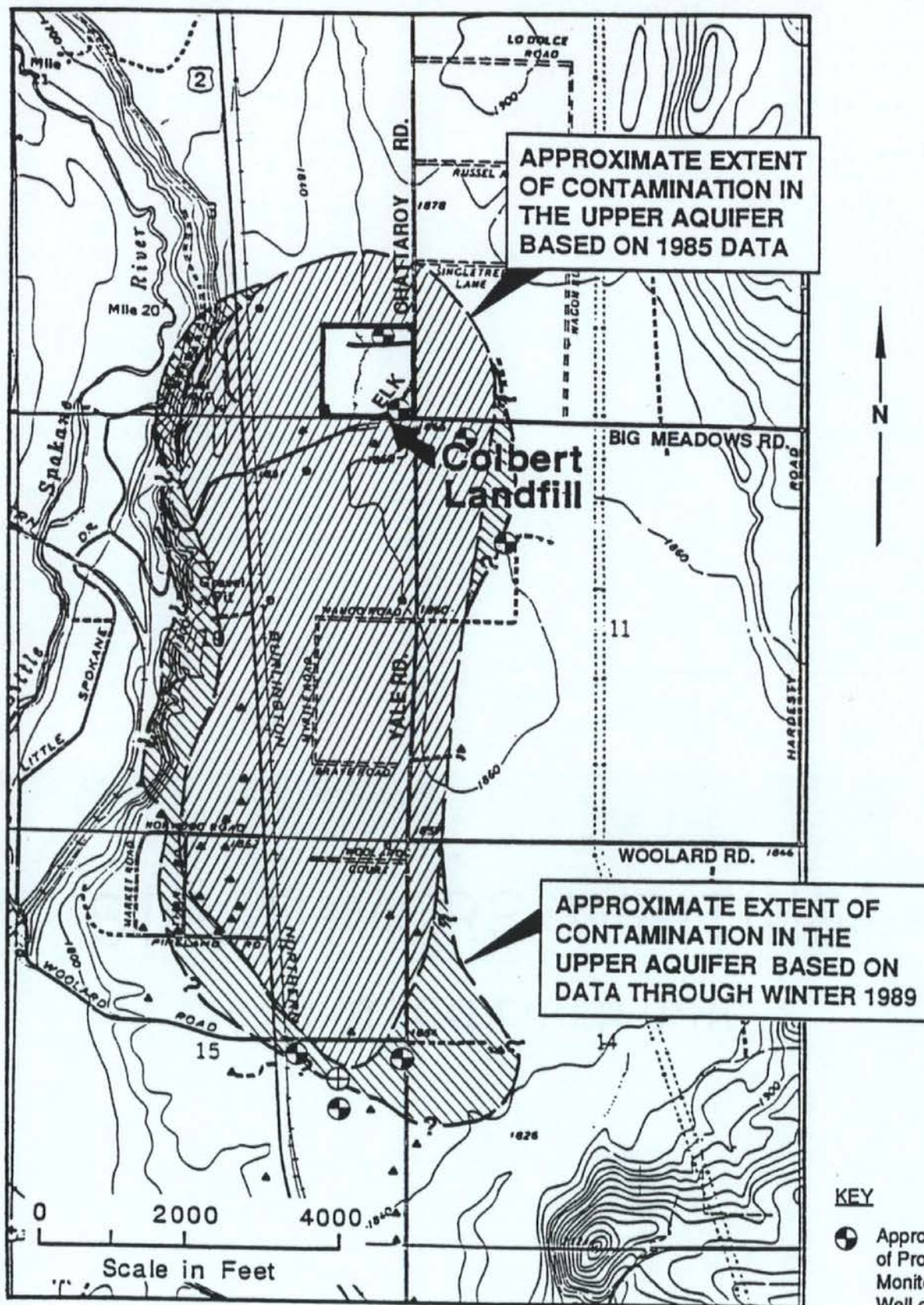
This plan applies to all personnel onsite. Contractors, subcontractors, regulatory agency representatives, and site visitors entering the Site work zones must adhere to the requirements of this plan by adoption, or use another plan which meets the minimum requirements established by this plan.

All individuals must read this Health and Safety Plan prior to participation in intrusive field work<sup>1</sup>. If any information presented in this plan is unclear, the reader must contact the Site

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1 For the purpose of this work plan, intrusive activities is defined as any subsurface work accomplished in an area and at a depth where contamination may reasonably be expected to be present.

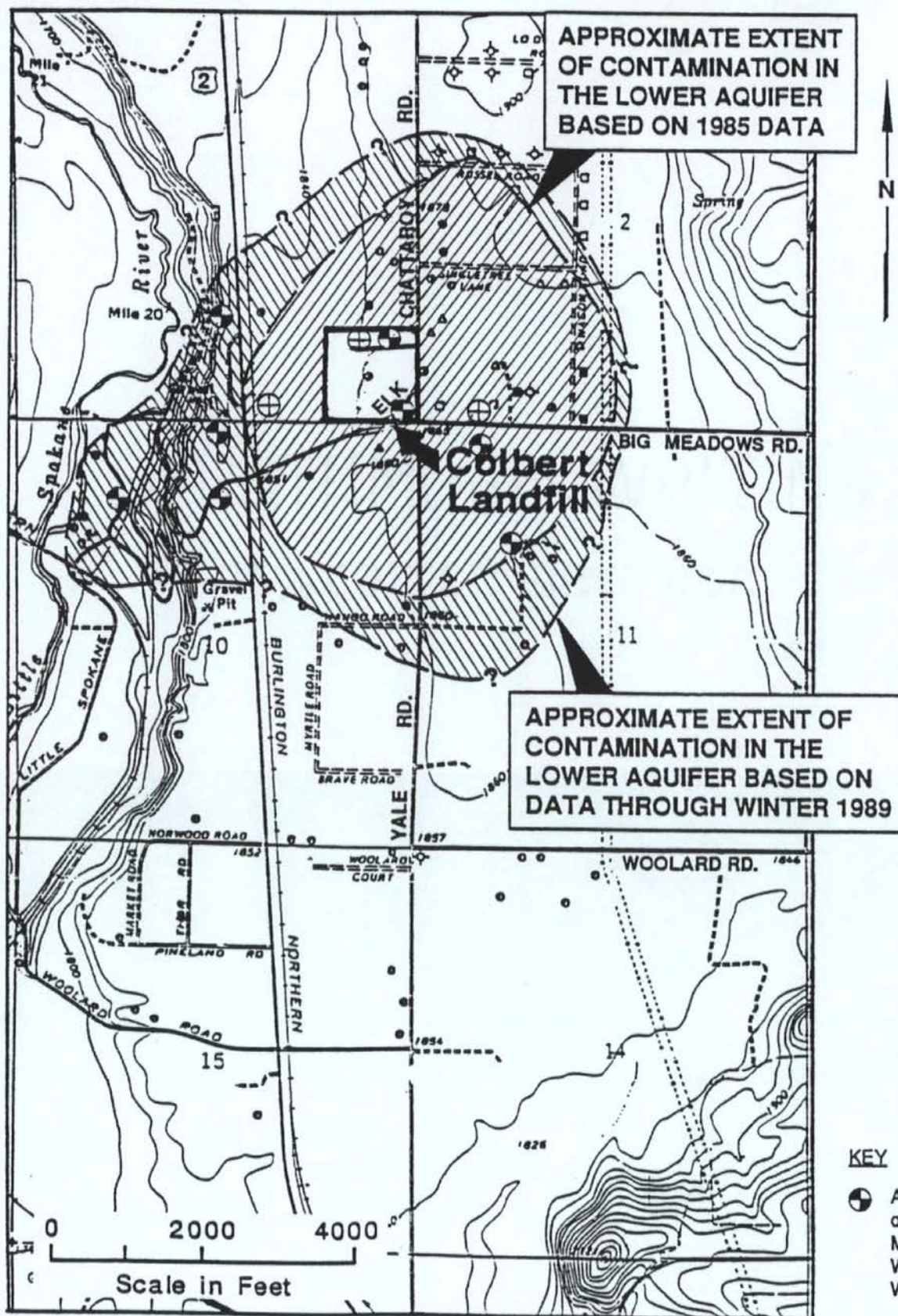




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Extent of Contamination and Phase I Well Locations  
Upper Aquifer





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Extent of Contamination and Phase I Well Locations  
Lower Aquifer



Safety Officer, the Landau Field Coordinator, or the Landau Project Manager for clarification prior to participating in any intrusive field activity. Once the information has been read and understood, the individual must sign the ACKNOWLEDGMENT (Form HS-1.4A), and this signed form will be placed in the job file. After mobilization to the Site has been completed, but before initiating intrusive activities, a training session will be conducted to familiarize personnel with health and safety procedures at the Site (see Section 10). Another training session will be conducted if intrusive work is to be performed within the refuse disposal area, and will include additional safety issues pertinent to that area (i.e., escape canisters, increased fire and explosion hazard).

This plan is flexible and allows unanticipated site-specific problems to be addressed, while providing adequate and suitable worker protection. The plan may be modified at any time, based on the judgment of the Site Safety Officer, the Landau Field Coordinator, and the Landau Project Manager. Any modification will be presented to the onsite team during a safety briefing and documented using Form HS-1.4B. Team members will sign this form, and the original will be attached to the Health and Safety Plan maintained in the project file. Copies will be attached to the Health and Safety Plan in the support zone trailer and in each field team vehicle.



FORM HS-1.4A

ACKNOWLEDGMENT

I have read the attached Health and Safety Plan\* for the Remedial Design/Remedial Action at the Colbert Landfill. I have discussed any questions I have regarding this plan with my supervisor and/or the Site Safety Officer, and I understand the requirements.

Employee \_\_\_\_\_ Date \_\_\_\_\_

Supervisor \_\_\_\_\_ Date \_\_\_\_\_

\* A copy of this Health and Safety Plan is to be placed in the support zone trailer and in each field vehicle.

FORM HS-1.4B<sup>1</sup>

MODIFICATION TO HEALTH AND SAFETY PLAN  
COLBERT LANDFILL

DATE    /    /   

Modification: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Reasons for Modification: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Signature of Site Personnel Briefed:

Name: _____	Date: _____
Name: _____	Date: _____
Name: _____	Date: _____
Name: _____	Date: _____
Name: _____	Date: _____
Name: _____	Date: _____
Name: _____	Date: _____

Approvals

Site Safety Officer: \_\_\_\_\_

Landau Project Manager: \_\_\_\_\_

Others: \_\_\_\_\_

- 1 The original of this Health and Safety Plan modification form will be filed in the project file. A copy of this form is to be placed with the Health and Safety Plan maintained in the support zone trailer and in each field vehicle.



## 1.5 RESPONSIBLE INDIVIDUALS

Safety during field investigations will be the responsibility of the Landau Project Manager, the Site Safety Officer, and the Landau Field Coordinator. Any one of these individuals may temporarily suspend an investigation if there appears to be a threat to health or safety. Either the Site Safety Officer, the Landau Field Coordinator, or a Landau Field Representative will be present at all times during intrusive activities. Safety-related responsibilities are described below.

### 1.5.1 Landau Project Manager

The Landau Project Manager has responsibility over all project safety policies, planning, and execution. He/she will be responsible for making project-level decisions regarding safety rules and operations in consultation with the Site Safety Officer and the Landau Field Coordinator.

### 1.5.2 Landau Field Coordinator

The Landau Field Coordinator is responsible for all day-to-day activities, including implementation of the safety plan at the Site. He/she will implement the safety plan as written, or consult with the Site Safety Officer where alternatives or assistance may be desirable or necessary. The Landau Field Coordinator will notify the Site Safety Officer of any unanticipated conditions that arise so that any necessary modifications can be made to the safety plan. Field team members will report suspect or unfamiliar condi-

tions to the Landau Field Coordinator. The Landau Field Coordinator shall:

- o Evaluate weather and hazard information, and make any necessary modifications to work plans and personal protection levels to maintain personnel safety;
- o Ensure that appropriate personal protection equipment is available and properly utilized by all employees; and
- o Ensure that contractors, subcontractors, regulatory agency representatives, and site visitors planning to enter the industrial work zone, exclusion zone, or the contamination reduction zone (described in Section 3.0) read this plan and sign a form acknowledging that either this plan becomes their own or they will adhere to the minimum standards of the plan.

#### 1.5.3 Site Safety Officer

The Site Safety Officer will conduct the initial orientation training and will be the main point of contact on project health and safety issues. He/she will be present onsite intermittently throughout the project, and will periodically audit safety at the Site. The Site Safety Officer shall:

- o Ensure that personnel are aware of the provisions of this plan, are instructed in safe work practices, and understand the planned procedures for dealing with site emergencies;
- o Inform personnel of the potential hazards associated with site operations;
- o Determine personal protection levels, necessary clothing, and equipment;
- o Correct any work practices or conditions that may result in injury to personnel or exposure to hazardous substances; and
- o Verify that appropriate personal protective equipment is properly used by all employees at the start of the project and periodically thereafter.



#### 1.5.4 Landau Field Representative

The Landau Field Representative (geologist, engineer, or technician) is responsible for implementing the safety plan during intrusive activities at the work site, including monitoring of organic vapors and explosive gases (where applicable). The Landau Field Representative will notify the Landau Field Coordinator or Site Safety Officer of any unanticipated conditions that arise that might necessitate modification to the safety plan. The Landau Field Representative will be responsible for implementing the appropriate level of personal protection based on the criteria established in Section 6.0, but will suspend work and evacuate the work site should hazards not addressed in this safety plan be encountered; work will only be resumed following evaluation of the hazard by the Landau Field Coordinator or the Site Safety Officer.

## 2.0 HAZARD/RISK EVALUATION

The scope of Phase I field activities at the Site includes:

1) installation and sampling of ground water monitoring wells and pilot extraction wells near the suspected perimeter of the contaminant plumes, and near the refuse disposal area; and 2) construction and operation of pilot extraction wells, pilot stripping towers, and water discharge systems; most of these facilities are located at a distance from the landfill, although a pilot stripping tower will be located at or near the southwest corner of the landfill.

The degree of overall hazard depends on the potential for:

1) exposure to toxic chemicals; 2) physical hazards from the use of drilling, sampling, and testing equipment; 3) site physical hazards including debris, uneven terrain, rattlesnakes, poor footing, and surface water; 4) extremes of the summer and winter climate in the Spokane area, and 5) the possibility for fire/explosion when drilling through the refuse disposal area. The degree of hazard or risk associated with intrusive activities, and the accompanying level of stringency for health and safety procedures, varies for the following three areas:

- o The refuse disposal area<sup>1</sup>;
- o The 75-foot buffer zone around the refuse disposal area; and

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1 Reportedly, at least a 30-foot buffer zone exists between the refuse disposal area and the landfill property boundary (Landau Communication 1989).



o Areas greater than 75 feet from the refuse disposal area. Health and safety procedures will be the most stringent for intrusive work performed on the refuse disposal area, somewhat less stringent for the 75-foot buffer zone, and the least restrictive for work performed at a distance of over 75 feet from the refuse disposal area.

Well drilling poses the greatest risk of physical injury for the activities that are to be completed during Phase I. To minimize the risk of injury from drilling activities, the drilling contractor(s) will be required to operate all drilling equipment in a safe and appropriate manner, and will be required to submit a document outlining the standard operating procedures for the drilling equipment intended for use on the project.

## **2.1 CONTAMINANT CHARACTERISTICS**

Several previous investigations and sampling efforts have been performed at the Site to determine the type and concentration of chemical contaminants in ground water, and in soil samples collected at aquifer depths (between about 80 feet and 180 feet). There is available information on the concentration of solvents in soil within the former solvent disposal areas of the landfill.

Information contained in the RI was used for assessing the site hazards and risks within the 75-foot buffer zone, and at further distances from the refuse disposal area. Six volatile chlorinated organic chemicals were identified in the RI as the main

contaminants detected in the ground water. Table HS-2.1 presents these contaminants of concern, which are common industrial solvents or their breakdown products.

The maximum contaminant concentrations detected in ground water for these six volatile organic chemicals, as reported in the ROD, are also presented in Table HS-2.1. Low levels (less than 0.02 parts per million [ppm]) of five other volatile organic chemicals (chloroform; methyl ethyl ketone; 1,2-dichloroethane; 1,2-transdichloroethylene; and toluene) were also detected, but were less widely distributed. Acetone was detected in three of the wells at concentrations up to 0.45 ppm; however, this is a common laboratory contaminant and could be attributed to laboratory sources. Two ground water samples were analyzed for the full range of priority pollutants including cyanide. Laboratory results indicated only trace levels of a common laboratory contaminant (0.1 ppm, bis-2-ethylhexyl phthalate), and a slightly elevated cadmium level (0.011 ppm) in one of the samples. These trace compounds were not included in the chemical exposure analysis because of their relatively low levels or limited distribution.

Several soil samples were collected during the advancement of five borings drilled to approximately 20 feet below the refuse as part of the RI. MC was the only chemical detected in these samples. However, volatile organic compounds other than MC may be present in refuse area soils since the borings were located outside



TABLE HS-2.1

MAXIMUM CONTAMINANT CONCENTRATIONS IN GROUND WATER AT  
COLBERT LANDFILL SITE

Contaminant	Concentration (ppb) <sup>(a)</sup>	
	Upper Aquifer	Lower Aquifer
1,1,1-Trichloroethane (TCA)	1,300	5,600
1,1-Dichloroethylene (DCE)	47	190
1,1-Dichloroethane (DCA)	600 <sup>(b)</sup>	420
Trichloroethylene (TCE)	72 <sup>(b)</sup>	230
Tetrachloroethylene (PCE)	23	1
Methylene Chloride (MC)	ND <sup>(c)</sup>	2,500

-----  
(a) Abbreviation of parts per billion; equivalent to micrograms per liter (ug/L).

(b) Concentrations recorded in 1984 by George Maddox and Associates in Well CW-13 which could not be sampled in 1985 due to low water levels.

(c) ND = not detected in any well in aquifer.

Source: Golder 1987. Measurements are from the Fall/Winter 1985 Remedial Investigation samples, except as noted.

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of areas where the solvents were disposed, and the drilling technique (air rotary) may have volatilized organic solvents prior to sampling.

#### 2.1.1 Toxicity

Selected health and safety criteria for the contaminants of concern are shown in Table HS-2.2. Vapor pressures are given to provide an indication of the chemicals' tendency to volatilize (the higher the vapor pressure, the more volatile it is). Possible exposure routes include inhalation of vapors, absorption through the skin or eyes, and ingestion. Specific health effects are described below.

##### 1,1,1-Trichloroethane (TCA)

TCA is a colorless, nonflammable liquid with a sweet odor. Target organs include the skin, eyes, cardiovascular system, and the central nervous system. TCA is irritating to the eyes, and repeated skin contact can lead to dermatitis. It acts as a narcotic and depresses the central nervous system. Exposure symptoms include dizziness, uncoordination, and drowsiness. Available data indicate that TCA is not a cancer-causing substance (EPA 1986).



TABLE HS-2.2

SITE EXPOSURE ASSESSMENT  
COLBERT LANDFILL SITE

Chemical Constituent	Abbrevi- ation	Maximum Concen- tration In Ground Water (ppb)		Exposure Limit In Air(a) (ppm)	IDLH(b) (ppm)	Vapor Pressure (mm) (c)
		Upper Aquifer	Lower Aquifer			
1,1,1-Trichloro- ethane	TCA	1,300	5,600	350	1,000	100
1,1-Dichloro- ethylene	DCE	47	190	5	-	180-265(d)
1,1-Dichloro- ethane	DCA	600	420	100	4,000	230
Trichloro- ethylene	TCE	72	230	50	1,000	100
Tetrachloro- ethylene	PCE	23	1	50	500	16
Methylene Chloride	MC	ND(e)	2,500	100	5,000	380

- (a) Washington State Permissible Exposure Levels (PELs), as provided in WAC 296-62 (Nov. 1988).
- (b) Immediately Dangerous to Life and Health (NIOSH 1985).
- (c) mm = Millimeters of Mercury. Vapor pressure will increase with temperature. From Dangerous Properties of Industrial Materials, 5th edition, Sax, 1979, except as noted otherwise.
- (d) From NIOSH Pocket Guide to Chemical Hazards, 1985.
- (e) ND = Not Detected.

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#### 1,1-Dichloroethylene (DCE)

DCE is a liquid with a slight acrid odor at room temperature. Target organs include the respiratory system, eyes, and central nervous system. It is irritating to the eyes and other mucous membranes. Exposure symptoms include dizziness, nausea, and intoxication similar to alcohol. DCE is classified as a possible human carcinogen (EPA 1986).

#### 1,1-Dichloroethane (DCA)

DCA is a colorless, clear, flammable liquid with a sweet odor. Target organs include the skin, liver, and kidneys. Exposure symptoms include central nervous system depression, skin irritation, drowsiness, and liver and kidney damage. Available data indicate that DCA is not a cancer-causing substance (EPA 1986).

#### Trichloroethylene (TCE)

TCE is a colorless, non-flammable liquid with a sweet odor. Target organs are the respiratory system, heart, liver, kidneys, central nervous system, and skin. TCE vapor irritates the eyes, nose, and throat. Repeated and prolonged skin contact may cause dermatitis. Exposure symptoms include headache, dizziness, nausea, irregular heart beat, drowsiness, and fatigue. TCE is classified as a probable human carcinogen (EPA 1986).



#### Tetrachloroethylene (PCE)

PCE is a clear, colorless, non-flammable liquid with a sweet odor similar to ether or chloroform. At higher concentrations the odor tends to become unnoticeable after a short period of time. Repeated skin contact can cause dermatitis. High concentrations may cause eye and nose irritation. Target organs include the liver, kidneys, eyes, upper respiratory system, and central nervous system. Signs and symptoms of overexposure include malaise, dizziness, headache, increased perspiration, fatigue, and decreased mental ability. PCE is classified as a probable human carcinogen (EPA 1986).

#### Methylene Chloride (MC)

MC is a clear, colorless, liquid with an aromatic odor. Target organs include the skin, cardiovascular system, eyes, and the central nervous system. Repeated contact with MC vapor irritates the eyes and upper respiratory tract. Repeated skin contact may cause dermatitis. Prolonged exposure symptoms include headache, irritability, numbness and tingling in the limbs. MC is classified as a probable human carcinogen (EPA 1986).

As some of the above exposure symptoms resemble signs of cold or flu, workers should inform the Site Safety Officer or Landau Field Coordinator whenever they are feeling ill. The Site Safety Officer and the Landau Field Coordinator will review the work area

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and previous activities to determine if overexposure may have occurred, and if current safety procedures are adequate.

#### 2.1.2 Potential for Chemical Exposure

Most well installation and ground water sampling activities will be conducted outside of the refuse disposal and buffer zone areas, at a distance of more than 1,000 feet from the source of the contamination. Therefore, the soil above the water table within these work areas is not considered contaminated; contaminated soil is limited to the saturated zone, which begins at approximately 80 feet below the ground surface for the upper aquifer. Levels of contamination in ground water at locations over 1,000 feet from the refuse disposal area are anticipated to be relatively low (less than about 3 ppm). Consequently, vapor exposure hazards from ground water or the potential for inhaling contaminated dust are minimal at these locations.

However, the potential for inhalation of chemical vapors or contaminated dust (especially when using the air rotary drilling method) are higher when drilling through contaminated soils within the refuse disposal area and (to a lesser extent) the buffer zone. Additional worker protection measures are necessary at these locations.

#### 2.2 WATER TREATMENT CHEMICALS

Water treatment chemicals such as chlorine may be necessary for pretreating extracted ground water before it is treated by the

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stripping tower. If chlorine is used, special safety precautions including chlorine-specific air-purifying respirators and additional worker training will be required. It is unknown exactly what type of chemicals (if any) will be required and, therefore, safety precautions for handling them are not included at this time. This plan will be modified as appropriate before pretreatment chemicals are used at the site.

### **2.3 PHYSICAL INJURY**

Field work near drill rigs, trucks, compressors, pumps, and generators will pose physical hazards associated with heavy equipment operation. Workers will need to be aware of this activity and be prepared to avoid moving equipment. The Landau Field Coordinator will be responsible for notifying utility officials prior to initiating intrusive activities and for assuring that the drilling location is free of underground utilities (i.e., gas, electrical, water, and sewer lines).

Construction Safety Standards and General Occupational Health Standards provided in Washington Administrative Code (WAC) 296-155 and WAC 296-62, respectively, will be followed.

### **2.4 HEAT-RELATED ILLNESSES**

Summer temperatures in the Spokane area may at times exceed 100 degrees Fahrenheit (°F). Heat-related illness can cause physical discomfort, loss of efficiency, personal injury, and, in the extreme, can be life-threatening. During periods of extreme

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hot weather, the Landau Site Coordinator or the Site Safety Officer may implement modified work hours, or suspend field activities, until more temperate weather returns.

Drillers and samplers are highly susceptible to heat-related illness when wearing protective clothing, which decreases natural body ventilation and, hence, cooling. Causes of heat-related illnesses include unacclimated workers, lack of physical fitness, being overweight, recent alcohol intake, dehydration, individual susceptibility, and cardiovascular disease. The three most common types of heat-related illness are heat cramps, heat exhaustion, and heat stroke, the symptoms of which are briefly described below.

Heat cramps are caused by profuse perspiration with inadequate fluid intake and chemical replacement (especially salts). Symptoms include muscle spasms and pain in the extremities and abdomen. First-aid treatment includes drinking half a glass of salt water (one teaspoon of salt per glass) every 15 minutes over a period of about one hour.

Heat exhaustion is caused by dehydration, or water deficiency. Symptoms include fatigue, nausea, headache, clammy and moist skin, and a pale complexion. First aid treatment includes taking the individual to a cooler environment and administering fluids.

Heat stroke is a life-threatening condition resulting from a failure of the body's temperature regulation ability, which leads to the loss of evaporative cooling and an uncontrolled accelerating rise in body temperature. If heat stroke is suspected, immediate

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medical attention is necessary. Symptoms of heat stroke include red, mottled, hot, and dry skin. First-aid treatment includes immediate cooling by spraying the individual with cool water or wrapping the individual in a wet sheet and vigorous fanning of the individual to reduce body temperature.

#### 2.4.1 Personnel Monitoring

Prevention of heat-related illness can be accomplished by medically screening workers, allowing workers to slowly acclimate to heat exposure, monitoring workers during sustained heat, and ensuring that ample drinking water is available at all times and is taken frequently during the work day.

The potential for heat-related illness can be drastically reduced by following a work/rest schedule for workers wearing protective gear. The schedule will be determined by the Site Safety Officer and will be based on field conditions, level of work effort, and individual reactions.

The Site Safety Officer and the Landau Field Coordinator will evaluate the health and physical fitness of field personnel prior to beginning field activities at the Site. This may include taking baseline pulse and temperature readings. These readings will provide the basis for comparison if vital sign monitoring becomes necessary during hot weather conditions. A person's body temperature and pulse rate will tend to rise while working in hot weather conditions. Workers who are ill (i.e., cold or flu), have sun-

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burns, or other difficulties should inform the Site Safety Officer or Landau Field Coordinator, as these conditions can affect vital sign readings.

If necessary, at the end of each work period, the workers will remove their protective clothing and the Site Safety Officer or Landau Field Coordinator shall do one or more of the following for each worker:

- (1) Take their oral temperature and proceed as given below:
  - a. Less than or equal to 99° F - no action.
  - b. Greater than 99° F and less than or equal to 99.7° F - cool them off with a water spray and do not allow them to return to work unless their temperature is 99° F at the end of the rest period.
  - c. Greater than 99.7° F and less than or equal to 100.4° F - cool them off with a water spray, double their rest period, and do not allow them to return to work unless their temperature is less than or equal to 99° F. If heat exhaustion or heat stroke symptoms are present, seek medical attention.
- (2) Take their pulse. If their pulse is over 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same. If the heart rate still exceeds 110 beats per minute at the next rest period, shorten the following work cycle by one-third.



- (3) Check carefully for symptoms of heat illness and react accordingly.
- (4) It is important that fluid intake be regular (suggested intake is approximately 1 cup every 20 minutes). Have each person slowly drink cool, but not cold, water or diluted unsweetened fruit juice.

Prior to each day's field activities, the team will ensure that sufficient drinking water or diluted fruit juice and ample cooling water (in a pressure sprayer) is on-hand. Be sure to keep all fluids and cooling water in the shade. Workers should remove their protective clothing as completely as possible during rest breaks to let the body cool and to help prevent heat rashes.

## **2.5 COLD-RELATED ILLNESSES**

Cold temperatures can also pose health hazards to field workers. Winter temperatures in the Spokane area are known to drop well below freezing. To prevent cold-related health hazards, field activities may be delayed during extreme cold weather. The serious health effects that can result from exposure to cold temperatures include hypothermia and frostbite. Hypothermia results from the lowering of the body's deep core temperature. Body core temperatures below 96.8° F cause reduced mental alertness, reduction in rational decision-making, and possibly the loss of consciousness

(which is potentially fatal). A person with hypothermia should receive medical attention immediately.

Signs of frostbite include sudden whitening of the skin and numbness. Treatment includes warming with blankets, warm compresses, or lukewarm water. Hot water, ointments, or massage should not be used.

Wind chill, or the cooling power of moving air, is of critical importance when evaluating the cold exposure to field workers. Table HS-2.3 provides information on the cooling power of the wind. The potential for frostbite increases with colder temperatures and higher wind speeds. Workers should inform the Site Safety Officer or Landau Field Coordinator if their hands, feet, or face feel numb, and workers should monitor each other for patches of pale skin on the face and ears.

Pain in the extremities may be the first early warning sign of the onset of cold-related illnesses; one of the last stages is severe shivering. Workers experiencing shivering should inform the Site Safety Officer or Landau Field Coordinator and should go to the heated support zone trailer until they feel that they have totally recovered from the effects of the cold weather. The Site Safety Officer or Landau Field Coordinator should monitor the remaining field team members.

Workers must wear adequate insulating clothing whenever temperatures are expected to be below 40° F. The most difficult areas to keep warm are the hands and feet. Light polypropylene or

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TABLE HS-2.3

## COOLING POWER OF WIND ON EXPOSED SKIN\*

Estimated Wind Speed (in mph)	Actual Temperature Reading (Degrees F)											
	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
	Equivalent Chill Temperature Reading (Degrees F)											
calm	50	40	30	20	10	0	-10	-20	-30	-40	-50	-60
5	48	37	27	16	6	-5	-15	-26	-36	-47	-57	-68
10	40	28	16	4	-9	-24	-33	-46	-58	-70	-83	-95
15	36	22	9	-5	-18	-32	-45	-58	-72	-85	-99	-112
20	32	18	4	-10	-25	-39	-53	-67	-82	-96	-110	-121
25	30	16	0	-15	-29	-44	-59	-74	-88	-104	-118	-133
30	28	13	-2	-18	-33	-48	-63	-79	-94	-109	-125	-140
35	27	11	-4	-20	-35	-51	-67	-82	-98	-113	-129	-145
40	26	10	-6	-21	-37	-53	-69	-85	-100	-116	-132	-148
(Wind speeds greater than 40 mph have little addi- tional effect.)	LITTLE DANGER In < hr with dry skin skin. Maximum danger of false sense of security.			INCREASING DANGER Danger from freezing of exposed skin within one minute.				GREAT DANGER Skin may freeze within 30 seconds.				

\* Expressed as an equivalent temperature under calm conditions. Developed by U.S. Army Research Institute of Environmental Medicine, Natick, MA.

cotton liner gloves (worn under PVC inner gloves) will be provided during the cold season. Workers may choose to wear leather or another type of heavier outer gloves (rather than the usual neoprene gloves). However, these outer gloves will then be treated as contaminated if they have been used in the refuse disposal or buffer zone areas. In addition, these outer gloves will be left in a clean plastic bag in the support zone area and shall not be taken back to the worker's car or home.

The steel-toe insert in neoprene chemical resistant boots aggravate the problem of cold feet during the winter months. To help alleviate this problem, workers will either be provided boots with impact-resistant plastic toe and shank inserts, or oversized steel toe and shank neoprene boots that will accommodate extra wool socks or a felt liner. Workers should not try to wear extra socks inside their normally-sized steel toe and shank boots, as this can lead to reduced circulation, resulting in even colder feet.

Other problems can arise during the cold season (i.e., duct tape may not stick, nitrile outer gloves can freeze, respirator exhalation valves can freeze shut, pens may not write, and decontamination water may freeze). Some of these problems can be eliminated (i.e., using a special tape made for cold weather use, or adding a little antifreeze to the boot wash water); however, workers and managers should be prepared for tasks taking more time during the winter months.



## 2.6 FIRE/EXPLOSION

There is the potential for encountering unknown hazardous materials within the refuse disposal zone, and pockets of potentially explosive methane gas (commonly present at landfills) when conducting intrusive activities within both the refuse disposal zone and the 75-foot buffer zone. Fire extinguishing equipment will be available and easily accessible on each drill rig used for intrusive work within the refuse disposal and buffer zones. This equipment will include dry chemical fire extinguishers and shovels for use in responding to minor fires only. In the event of a major fire or explosion, all personnel will immediately evacuate to a safe area upwind. The Site Safety Officer and/or the Landau Field Coordinator will evaluate the need for further evacuation and/or emergency services.

Additionally, 5-minute air escape canisters will be provided to workers conducting intrusive activities within the refuse disposal zone. Workers will be trained in their use before beginning refuse disposal zone intrusive work.

## 2.7 RATTLESNAKES

Rattlesnakes are known to be present in the Spokane area, and although the potential for encountering a rattlesnake is low, workers should be cautious when walking through brush and vegetation around the Site. Rattlesnakes are usually 35 to 45 inches long, have a pit between the eye and nostril on each side

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of the head, elliptical pupils, and two large fangs. Non-poisonous snakes have round pupils, and no fangs or pits.

First aid for a snakebite victim includes: 1) transporting the victim to the hospital as quickly as possible; 2) keeping the victim still, calm, and preferably in a lying position; and 3) immobilizing the bitten extremity and keep it at or below the heart level.



### 3.0 WORK AREAS

#### 3.1 INDUSTRIAL WORK ZONE

Even though the chemical exposure hazards are suspected to be minimal for intrusive activities conducted at a distance greater than 75 feet from the refuse disposal area, physical hazards posed by the use of heavy equipment such as drill rigs, compressors, etc., warrant the institution of controlled access to the work area. An industrial work zone will be instituted within 50 feet of intrusive activities, and will be designated with caution tape or traffic cones. When working adjacent to public roads, work zone boundaries may be modified to allow continued traffic flow. Only field team members will be allowed in this industrial work zone.

Access to work areas within the refuse disposal area and the 75-foot buffer zone around the refuse disposal area will be controlled through the institution of an exclusion zone, a contamination reduction zone, and a support zone. These zones are described below.

#### 3.2 EXCLUSION ZONE

The exclusion zone is the area in which the highest hazard level exists. The exclusion zone will be an area within a 50-foot radius immediately surrounding the borehole or monitoring well. This area will be designated with traffic cones or caution tape. Only field team members will be allowed in the exclusion zone, and full protection gear as described in Sections 5 and 6 of this plan will be required in this zone.

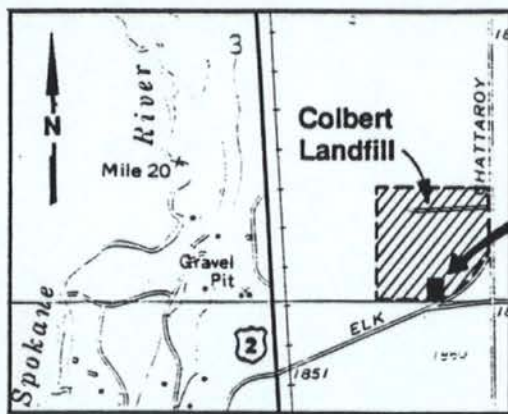
### 3.3 CONTAMINATION REDUCTION ZONE

The contamination reduction zone will consist of a 10-foot wide zone between 50 and 60 feet from the monitoring well or borehole, and will be established for both personnel and equipment decontamination. This area will be used to prevent the transfer of contaminants to the support zone, and will be equipped with garbage bags, decontamination solutions, and other supplies. All potentially contaminated materials will be placed on plastic sheeting. Personnel will adhere to the decontamination procedures as specified in Section 7.0. As described for the industrial work zone, the boundaries of the exclusion and contamination reduction zones may be modified to allow traffic flow along public roads, provided that doing so does not pose a threat of exposure or injury to the public.

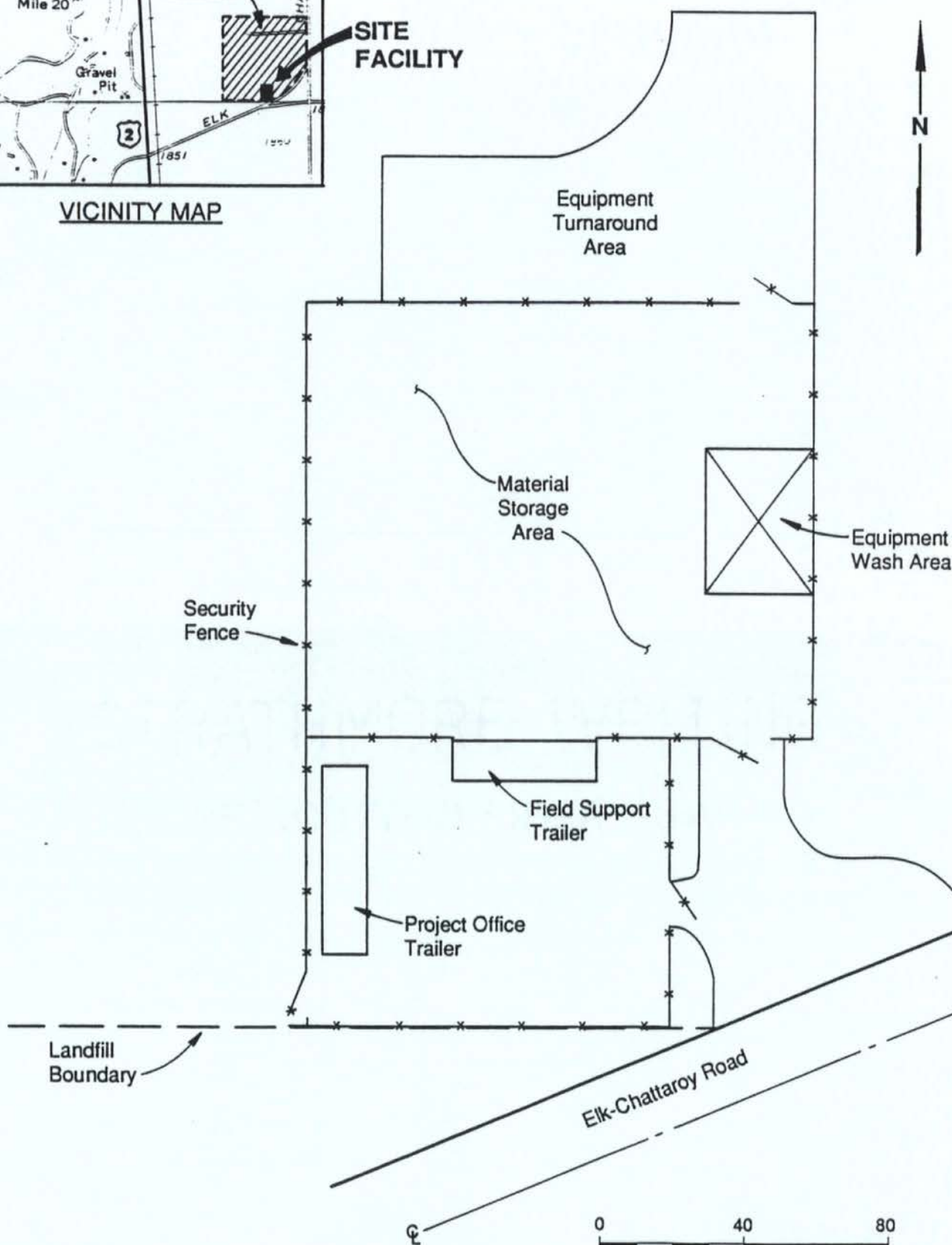
### 3.4 SUPPORT ZONE

The support zone covers all areas outside of the contamination reduction zone and includes the project support zone (which will be established for the duration of the project) or the field support zone (car or van at a specified distance from the project support zone). The project support zone will be located near the southeast corner of the landfill. A diagram of the fenced project support zone area, including a location map, is provided on Figure HS-3.1. The project support zone will provide a secure area for clean equipment storage, an equipment wash area, and parking. Personnel rest and eating facilities and a telephone will be provided in the project office trailer.

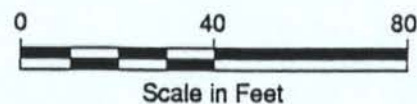




VICINITY MAP



Note: Facility location and dimensions are tentative and may be modified based on property access and project needs.



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Proposed Project Support Zone Layout

#### 4.0 SITE SECURITY

Site security will be the responsibility of the Landau Field Coordinator. Access to the project support zone will be controlled by security gates. These gates will be closed during non-working hours.

All site visitors must be approved by the Landau Project Manager or the Landau Field Coordinator. Visitors will be allowed to observe operations from the support zone only, and must obey all instructions of the Site Safety Officer, the Landau Field Coordinator, and the Landau field team members. Individuals entering the work zones (other than the support zone) must complete the training discussed in Section 10.0 and medical monitoring discussed in Section 11.0 prior to admittance.

Field team members will also be responsible for ensuring that unauthorized individuals do not enter the industrial work, exclusion, or contamination reduction zones at drilling or sampling locations. As public and news media interest in this site has been high in the past, field team members should be prepared to advise onlookers to maintain a safe distance from intrusive activities. Field team members should direct the press to the Spokane County Utilities Department representative, or to the Landau Field Coordinator. Answers to questions posed by property owners should be limited to providing a description of the work that the field team is about to perform. Questions requiring interpretation or value judgements should be directed to the Spokane County Utilities Department representative or the Landau Field Coordinator.



If necessary, 24-hour site security will be provided during this project to assist in site control, maintaining a record of site visitors, and providing security for valuable equipment. Equipment should be stored in a secure area (i.e., inside the trailer or van) each evening.

At the end of each day's intrusive activities, boreholes or monitoring wells will be secured with a lock if possible, or by using the drill rig to place an immovable object over the opening.

## 5.0 AIR MONITORING FOR RESPIRATORY PROTECTION

Inhalation is one of the major routes of exposure to chemical toxicants, particularly for volatile organic compounds (such as those known to be present at the Site). The level of respiratory protection required for workers performing intrusive activities will be determined based on the location (with respect to the landfill) of these activities, and the concentration of organic vapors measured near the work site during these intrusive activities.

Monitoring for organic vapors will be accomplished within the worker breathing zone using a photoionization meter. This is a portable instrument that measures the concentration of ionizable compounds in air. The photoionization meter will be configured with a 10.6 electron volt ultraviolet lamp, which is sufficient to ionize most of the volatile organic chemicals previously detected in the ground water at the Site (see Table HS-2.1) and which may be present in the atmosphere around intrusive activities. MC cannot be detected with standard field photoionization equipment. However, since the Permissible Exposure Level (PEL) for MC is relatively high (see Table HS-2.2), and during previous investigations it has only been present (in significant concentrations) in combination with other "detectable" compounds, the use of field monitoring equipment capable of detecting MC is not considered necessary for this project at this time. If significant concentrations (above 20 ppm) of volatile organic compounds are detected by the photoionization detector, other field monitoring equipment (i.e. detector tubes) will be used to ensure that methylene chloride is not present in concentrations approaching the PEL.

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Air monitoring for total particulates or airborne dust levels will not be performed because soil samples collected during the RI did not reveal appreciable levels of contamination; however, physical dust control methods will be used (especially during air rotary drilling). These dust control methods include wetting disturbed soil, and/or covering the rotary drill rig cutting hose and keeping it securely tied down as far downwind from workers as possible.

A Combustible Gas Indicator (CGI) will be used to monitor the atmosphere near and in boreholes installed in the refuse disposal and buffer zone areas for potentially explosive methane gas. The CGI will provide results as a percentage of the Lower Explosive Limit (LEL).

Backup instrumentation will be maintained onsite to ensure availability. The calibration of the photoionization meter and CGI will be checked each morning, and after each day's work. The instruments will not be recalibrated at the end of the day; however, the results of the calibration check will be recorded. These results will be recorded for the duration of the project.

#### 5.1 ACTION LEVELS

Table HS-5.1 lists action levels that will trigger an upgrade of respiratory protection, or when area evacuation is necessary due to the presence of explosive gases. Workers will evacuate the area if the CGI indicates readings of over 20 percent of the LEL. Workers will allow the gases to vent and dissipate for at least 30 minutes before returning to take another reading with the CGI.

TABLE HS-5.1

ACTION LEVELS FOR RESPIRATORY PROTECTION  
AT THE COLBERT LANDFILL SITE

Monitoring Parameter	Reading <sup>(a)</sup>	Level of Protection
Combustible Gas (during intrusive activities in the refuse disposal and buffer zones)	10-20% of Lower Explosive Limit (LEL)	Continue onsite moni- toring with extreme caution as higher levels are encountered
	> 20% LEL	Explosion hazard; withdraw from area immediately
Organic Vapors <sup>(b)</sup> (during all intrusive activities)	0-5 ppm over background <sup>(c)</sup>	Level D (modified)
	5-500 ppm over background	Level C - Full-face air purifying respir- ator equipped with organic vapor and high efficiency particulate cartridges
	>500 ppm over background	Level B

- (a) Sustained readings over a one minute duration.  
 (b) Determine using a photoionization or other appropriate organic vapor detector.  
 (c) Background readings obtained 50 feet upwind of site activity.



An action level of 5 ppm has been established for volatile organic vapors. The 5 ppm action level is the Washington State PEL for DCE, which has the lowest PEL for the volatile organic contaminants previously found at the Colbert Landfill (see Table HS-2.2). The ionization potential for DCE is 9.46 ppm, which is readily detectable using a photoionization meter. Respiratory protection will be required: 1) if breathing zone organic vapor readings exceed 5 ppm for over one minute; 2) for intrusive activities conducted on the refuse disposal area; and 3) during the first boring in each buffer zone well cluster (respiratory protection will not be required for additional wells in the buffer zone cluster if total organic vapor readings measured during the first boring are less than 5 ppm).

Each worker will be assigned a full-face organic vapor and high-efficiency particulate cartridge respirator at the beginning of the project. The Site Safety Officer or Landau Field Coordinator will fit-test workers prior to the initiation of intrusive work, and will fit-test new Landau employees as they are brought onsite. Subcontractors will be responsible for fit-testing their own employees if the workers arrive subsequent to the initial site orientation meeting. Respirators will be placed in clean plastic bags and stored in the work zone for easy access if they are needed.

A full-face respirator, equipped with organic vapor and high-efficiency particulate cartridges, provides a protection factor of 100. Thus, it may be worn in concentrations up to 100 times those established above. Field conditions are not expected to reach or

exceed this 100 protection factor level, such that a supplied air respirator (Level B protection) would be required. If conditions are encountered which warrant Level B protection, safety procedures will be revised prior to commencing or continuing such activities. For example, site personnel will withdraw from the exclusion zone to the contamination reduction zone. After a one-hour delay, the exclusion zone will be re-entered while monitoring continues. If levels still exceed the Level B action level, work will proceed only using Level B protection until exposures are again below the Level B action level.



## 6.0 PERSONAL SAFETY EQUIPMENT

Levels of protection have been defined by the EPA in the EPA Standard Operating Guide, 1984. The levels of protection that will be needed for work on the Site are described below.

### 6.1 LEVEL D

Level D may be worn when there is no potential for splashing, and there is no potential for unexpected inhalation of chemicals.

Level D equipment includes:

- o Hard hat when working around construction or moving equipment;
- o Safety glasses when working around construction or moving equipment;
- o Long-sleeved shirt and long-pants, or coveralls;
- o Gloves (neoprene or PVC gloves must be used when handling potentially contaminated items such as sample bottles or equipment); and
- o Boots/shoes, leather or chemical resistant, steel (or impact-resistant plastic) toe and shank.

Level D may be worn during the following activities at the Site:

- o When working in the support zone;
- o During non-intrusive construction work; and
- o During the first 60 feet of drilling outside the refuse disposal and buffer zones (where contamination is limited to the saturated zone beneath the ground surface).

### 6.2 LEVEL D (MODIFIED)

Level D (modified) will be worn when a higher degree of dermal or skin protection is needed and respiratory protection is not needed. For intrusive work performed at a distance of over 75 feet

from the refuse disposal area (outside the buffer zone), Level D (modified) will be necessary to prevent cross contamination of drilling and sampling equipment; however, contaminated vapor and dust exposure levels are expected to be minimal. Level D (modified) equipment includes:

- o Hard hat (a splash shield will be used when a high splashing potential is present);
- o Safety glasses;
- o One-piece disposable coveralls, hereafter referred to as "Tyvek" (saran or poly-coated Tyvek when needed for greater splash protection, or when raining);
- o Thin PVC inner-disposable gloves;
- o Thin PVC outer-disposable gloves for non-abrasive work, neoprene outer gloves for heavy work where potential for tearing or puncturing gloves exists (drillers may wear leather outer gloves, but gloves will be treated as contaminated after use in the exclusion zone);
- o Neoprene steel (or impact-resistant plastic) toe and shank chemically resistant boots;
- o Boot to Tyvek and glove to sleeve seams must be sealed with duct tape when drilling within the refuse disposal area or buffer zone.

Level D (modified) may be worn during the following work activities at the Site:

- o Drilling at more than 60 feet below the ground surface at locations outside the refuse disposal and buffer zones;
- o Drilling in the buffer zone area (if a downgrade of respiratory protection is supported by air monitoring data collected during previous drilling activities within 50 feet of the new boring location);
- o Installing and developing wells;
- o Conducting minor intrusive work within the refuse disposal area;
- o Taking water level readings (eye protection required when deconning tape);

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- o Collecting ground water samples (eye protection required when taking flow readings while purging well, and whenever the potential for splashing exists); and
- o When pressure washing.

Periodic (approximately once per hour and more frequently when necessary) air monitoring is required during these activities.

### 6.3 LEVEL C

Level C protection differs from Level D (modified) protection in that it affords a higher degree of respiratory protection. Air-purifying respirators are worn to reduce atmospheric contaminant levels before air enters the lungs. Level C protective gear includes:

- o Level D (modified) equipment (saran or poly-coated Tyvek required when conducting intrusive work in the refuse disposal zone, and taped glove to Tyvek and boot to Tyvek seams whenever Level C is required); and
- o Full-face respirator with high efficiency particulate and organic vapor cartridges (MSHA/NIOSH approved).

Level C protection will be required for drilling activities within the refuse disposal area or during installation of the first well within each buffer zone well cluster. Frequent (about every 1/2 hour) air monitoring to a depth of about 90 feet, and (about every hour) air monitoring at greater depths, is required.

### 6.4 LEVEL B

Level B affords the highest degree of respiratory protection (supplied air), with the same level of skin protection as described for Level C. Level B is used when a high level of respiratory

protection is required, but not skin protection provided by a fully-encapsulated suit (Level A). Level B equipment includes:

- o Level D (modified) equipment (with saran or poly-coated Tyvek, including taped glove to Tyvek and boot to Tyvek seams); and
- o Supplied-air respirator (MSHA/NIOSH approved); respirators may be pressure-demand, self-contained breathing apparatus or pressure-demand, airline respirators (with escape bottles).

Level B is not expected to be needed for work at the Site. Level B equipment will be available for emergency situations only while workers are drilling within the refuse disposal area.



## 7.0 DECONTAMINATION

Workers leaving the industrial work zone (designated work area at locations further than 75 feet from the perimeter of the refuse disposal area) will remove disposable clothing and gloves. These items will be disposed of daily and will be treated as non-contaminated trash if organic vapor readings detected during intrusive work within the industrial work zone are less than the 5 ppm action level. If the 5 ppm action level is exceeded, a formal decontamination procedure (as outlined for the refuse disposal and buffer zone areas) will be instituted, and disposable items will be treated as contaminated trash.

Strict decontamination procedures are required for intrusive work performed within the refuse disposal area and the 75-foot buffer zone. In these areas, all personnel and equipment must be properly decontaminated before entering the support zone from the exclusion zone.

### 7.1 REFUSE AND BUFFER ZONE PERSONNEL DECONTAMINATION PROCEDURES

A decontamination area will be set up in the contamination reduction zone. Before commencing work, all personnel will be trained by the Site Safety Officer in site-specific decontamination procedures. Personnel decontamination will be as follows:

- Step 1: Place equipment on plastic sheeting just inside contamination reduction zone.
- Step 2: Discard outer gloves.
- Step 3: Wash and rinse boots.
- Step 4: Decontaminate equipment with disposable wetted rags. Place disposables in receptacles.
- Step 5: Remove Tyvek. Place disposables in receptacles.

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- Step 6: Remove, wash, rinse, and sanitize respirator (if used).
- Step 7: Discard inner gloves.
- Step 8: Enter support zone.
- Step 9: Wash hands and face.
- Step 10: Workers should shower in the support zone trailer (if shower facilities are available), or immediately upon returning home.

## 7.2 EMERGENCY DECONTAMINATION

Prior to beginning intrusive activities, Holy Family Hospital and the local fire district will be notified as to project activities and chemical exposure concerns that could accompany an emergency situation.

In case of an emergency, gross decontamination procedures will be speedily implemented if possible. Portable eye washes will be available in the first-aid kits maintained for each command post (i.e., van or trailer) located within the field support zone. Portable water sprayers will be available in all contamination reduction zones. If a life-threatening injury occurs that results in the individual becoming highly contaminated, and the injured person cannot undergo decontamination procedures without incurring additional injuries or risk, he or she will be transported wrapped in plastic sheeting. The medical facility will be: 1) informed that the injured person has not been decontaminated and, 2) given information regarding the most probable contaminants.



### 7.3 RESPIRATOR DECONTAMINATION

Certain parts of contaminated respirators, such as the harness assembly or cloth components, are difficult to decontaminate. If grossly contaminated, they will be discarded. Rubber components will be soaked in soap and water and scrubbed with a brush. Respirators will be sanitized by rinsing in a detergent solution followed by several clear rinses, then hung to dry.

Each person will be responsible for decontaminating his/her own respirator at the end of each day of use, and will be trained in respirator maintenance as part of the health and safety training program.

### 7.4 SAMPLING EQUIPMENT DECONTAMINATION

Sampling equipment will be decontaminated prior to and at the end of sampling activities. Sampling equipment decontamination includes a tap water rinse, an Alconox wash, another tap water rinse, and a final rinse with distilled water. Sampling equipment used outside the refuse disposal area and buffer zone will be decontaminated primarily to prevent cross contamination, since soil and water in these areas are considered non-hazardous.

### 7.5 HEAVY EQUIPMENT DECONTAMINATION

Heavy equipment used outside the refuse disposal area and buffer zone will be decontaminated at the project support zone; as described above for sampling equipment, decontamination is primarily to prevent cross contamination between borings. Equipment used within the refuse disposal or buffer zones will be either thoroughly decontaminated prior to leaving the contamination

reduction zone or will be wrapped in plastic sheeting and transported to the support zone for decontamination. Particular care will be taken in decontaminating heavy equipment parts that have come into direct contact with contaminants.

For wet decontamination procedures, high-pressure hot water cleaning will be used. Physical scrubbing with disposable brushes will be used when necessary to loosen materials.

The equipment decontamination area will be established downwind of field workers. Workers should stand as far away from the steam plumes as possible, as the steam will tend to entrain potentially contaminated particulates.

#### **7.6 DISPOSAL OF CONTAMINATED FLUIDS AND MATERIALS**

All equipment and materials used for decontamination of personal protection will be cleaned or collected for appropriate disposal. All non-disposable clothing and equipment will be decontaminated. Disposables will be containerized. Equipment decontamination water, drilling water, and well purge water will be screened for organic vapors by passing a photoionization meter over the water's surface. If readings above background are detected, air will be bubbled through the water to remove residual volatile organics. Once the residual volatile organics have been removed, the water will be considered non-hazardous and disposed of at the work station.

Soil cuttings from the refuse disposal area and buffer zone will be disposed of in the refuse disposal area. Soil cuttings from outside these areas will be screened for organic vapors in a



manner similar to that described above for water. If readings above background are detected, the cuttings will be disposed of in the refuse disposal area; otherwise, cuttings will be considered non-hazardous and may be disposed of at the work site, if appropriate, or in the refuse disposal area.

#### 7.7 HOUSEKEEPING

Work areas will be kept clean and orderly at all times. Ordinary refuse will be placed in suitable trash containers at the site. Extraneous materials will be minimized within the exclusion zone as this increases the decontamination load and introduces possibilities for cross contamination.

## 8.0 SAFETY RULES AND PROCEDURES

Safety is the responsibility of every individual involved with this project. Whether in the office or onsite, properly followed procedures are essential for personal safety and to minimize lost time due to injuries or accidents involving equipment.

### 8.1 OVERALL SAFETY RULES

All personnel working in the field will follow these rules and procedures:

- o All personnel must comply with established safety procedures. Any employee who does not comply with this Health and Safety Plan may be immediately dismissed from the site.
- o Working while under the influence of intoxicants, narcotics, or controlled substances is prohibited.
- o Personnel taking prescription medicine should inform the Site Safety Officer if the medication is suspected to impair the worker's abilities, and if the medication must be taken at specific times during the day. Personnel may not take medicine in areas other than the support zone.
- o Only properly trained and licensed drillers or driller's assistants will be allowed to climb or stand on drilling machinery, unless otherwise authorized by the Site Safety Officer or the Landau Field Coordinator. The Landau Field Geologist will not assist with operating the drill rigs. Other individuals (i.e., samplers and air monitoring personnel) will stand at a safe distance from the drill rig when it is operating. All personnel should remain alert and prepared to avoid moving equipment if necessary.
- o Long hair must be tied back and contained inside a hard hat when working around moving machinery.
- o Be especially careful around drill rigs, compressors, and pumps, as protective clothing, fingers, or hair can be caught in moving parts. Also, machinery such as the compressor and generator may become extremely hot during use.
- o Ear plugs should be used when working around loud machinery and when reduced hearing would not present a hazard (i.e., well development, and purging).



- o Eating, drinking, chewing gum or tobacco, smoking, or any practice that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in the exclusion and industrial work zones.
- o Smoking is allowed in designated areas of the support zone only.
- o Meals at the site will be eaten only within the support zone.
- o Whenever possible, field team activities will be staged upwind of the drill rig and monitoring wells. The air rotary drill cutting outlet will be placed as far downwind from field workers as possible.
- o Whenever possible, walking through puddles, mud, or across any discolored ground surface in the refuse disposal area or buffer zone is to be avoided. If work is to be performed inside the refuse disposal area, kneeling, leaning, sitting, or placing equipment on potentially contaminated drums, containers, vehicles, or the ground is prohibited.
- o Care will be exercised when proceeding on foot through uneven terrain, and workers should remain alert as rattlesnakes are sometimes found in the area.
- o Exchange of personal protective equipment will not be allowed.
- o If any physical discomfort is experienced (abnormalities, light-headedness), immediately stop work, tell your co-workers, and leave the exclusion zone together.
- o If any personal protective equipment fails, proceed immediately to the contamination reduction zone.
- o At least two persons must be present in the exclusion zone at all times while it is occupied.

## 8.2 BEFORE LEAVING THE SUPPORT ZONE TRAILER

- o Prior to leaving the support zone trailer, review site information updates. These will provide important information concerning:
  - Expected hazards,
  - Special conditions,
  - Sampling procedures,
  - Location of phone,
  - Emergency medical information, and
  - Level of personal protection required;
- o Finish eating and extinguish cigarettes;

- o Attend safety briefing and worker question-and-answer period; and
- o Check safety gear and equipment.

### 8.3 BEFORE ENTERING THE EXCLUSION ZONE

- o Prior to entering the exclusion zone, place sample containers in field sample carrier;
- o Check location of portable first-aid kit, two-way radio, fire extinguisher, and water supply;
- o Conduct daily inspection of primary personal safety equipment for damage or wear, and replace or repair faulty equipment before re-entering the exclusion zone. Workers will assist each other in this inspection; and
- o Lay out and check alternate safety gear (first-aid kit, and extra clothing) daily for tears or malfunctions. Immediately repair or replace any damaged or missing gear or equipment.



## 9.0 EMERGENCY RESPONSE PROCEDURES

### 9.1 EMERGENCY COMMUNICATIONS

#### 9.1.1 Location of Nearest Phone

A telephone will be located in the support zone at the office trailer. Numbers of emergency facilities and personnel will be located adjacent to the telephone.

#### 9.1.2 Air Horn

An air horn will be stationed in each vehicle and at the support zone trailer, and will be used in the following manner:

<u>Blasts</u>	<u>Meaning</u>
1 long (L)	Evacuate zone immediately.
2 short (S)	Localized problem (not dangerous to workers). Workers move to contamination reduction zone for further instructions.
L/S/L/S	Need help at work location.
2 long	All clear. Resume work.

#### 9.1.3 Two-Way Radios

Portable two-way radios or cellular telephones will be used at each field team location to communicate with the command post trailer and other field team members.

#### 9.1.4 Wind Direction Indicators

Wind direction indicators will be erected at each work area. In an emergency situation, workers should check the wind direction indicator and then evacuate in the upwind direction.

#### 9.1.5 Hand Signals

Hand signals will be established and standardized among all workers. Each worker will immediately inform co-workers of dangerous situations. The following hand signals will be used by team members:

Thumps up - Okay

Thumbs down - Not okay

Hands on Waist - Exit exclusion zone

Hands on Throat - Cannot breath

Rotating hands above head - Need help

Rotating hands to the side - Situation under control

Hands on Head - Return to support zone

#### 9.2 ONSITE EMERGENCY EQUIPMENT

An Industrial First-Aid Kit, including a description of CPR and other emergency first aid, a portable air horn, and an eyewash kit will accompany each field vehicle.

#### 9.3 OFFSITE EMERGENCY SERVICES

Phone numbers for offsite emergency services are listed inside the front cover page. Copies of the emergency numbers will be located in each vehicle and at the support zone trailers.

#### 9.4 NON-LIFE THREATENING INJURIES

In emergency situations which are not life-threatening (e.g., a broken leg), some decontamination procedures may be modified according to the specific circumstances. The victim should be moved outside the exclusion zone and outer protective clothing



should be removed if doing so would not cause delays or aggravate the injury. Respirators should only be removed: 1) if the victim has stopped breathing, or 2) after the victim has been removed from a breathing hazard area. Normal decontamination procedures should be followed when possible.

Bodily injuries that occur as a result of an accident during operations at the site will be handled in the following manner:

- o The victim will be moved outside of the exclusion zone and will be administered to by an individual who holds current first-aid and/or CPR certifications utilizing the emergency equipment onsite (support zone trailer or field vehicles).
- o The local first-aid squad/rescue unit, a local hospital, and the Site Safety Officer will be notified depending on the nature of the emergency.

#### 9.5 EVACUATION

The Landau Field Coordinator will be responsible for determining if circumstances exist that require re-evaluation and/or evacuation, and should always assume worst case conditions until proven otherwise. Specific evacuation procedures and warning signs and signals will be covered in the health and safety training session prior to beginning work. Two levels of evacuation have been considered: 1) withdrawal from the immediate work area onsite, and 2) evacuation of the surrounding area.

##### 9.5.1 Work Area

Withdrawal to a safe upwind location will be required under the following circumstances:

- o Detection of volatile organics and/or toxic gases at concentrations above action levels for the level of protection being worn (see Section 5.1);

- o Occurrence of a minor accident -- field operations will resume after first-aid and decontamination procedures have been administered; and
- o Malfunction or failure of protective equipment, clothing, or respirator.

#### 9.5.2 Surrounding Area

There are no foreseeable conditions, based on current knowledge of the site, that would require evacuation of the surrounding area. The Landau Field Coordinator, in consultation with the Site Safety Officer and the Landau Project Manager, will be responsible for determining if circumstances exist for area-wide evacuation, and should always assume worst-case conditions until proven otherwise. Fire and police departments must be contacted. A list of emergency response individuals familiar with site work, including addresses and telephone numbers (inside cover page), will be located at the site, and will be carried by both the Landau Field Coordinator and the Site Safety Officer. If evacuation is necessary, it will be implemented with the assistance of these emergency response personnel.

#### 9.6 ACCIDENT/INCIDENT REPORTING PROCEDURES

Procedures for reporting accidents/incidents are listed below. They will be performed in the order indicated.

- (1) Call appropriate emergency services numbers (ambulance, fire, etc.). Provide information listed below.
- (2) Call Landau Associates: Larry Beard, Day (206) 778-0907; Night (206) 337-2924; local telephone numbers to be supplied



following site mobilization; Landau Associates will notify the Washington State Department of Labor (1-800-547-8367).

- (3) The Site Safety Officer will complete a written accident/incident report using Form HS-9.6A, within 24 hours, sending copies to the persons listed below:

Distribution of Accident/Incident Reports:

Landau Project Manager

Landau Field Coordinator

Spokane County Utilities District Project Manager

The information provided in the "Employee Exposure/Injury Incident Report" is not to be released under any circumstances to parties other than those listed in this section, bona fide emergency response team members, or appropriate regulatory agency personnel.

FORM HS-9.6A  
EMPLOYEE EXPOSURE/INJURY INCIDENT REPORT  
(Use additional page if necessary)

Date: \_\_\_\_\_ Time: \_\_\_\_\_

Name: \_\_\_\_\_ Employer: \_\_\_\_\_

Site Name and Location: \_\_\_\_\_

Site Weather (clear, rain, snow, etc.): \_\_\_\_\_

Nature of Illness/Injury: \_\_\_\_\_

Symptoms: \_\_\_\_\_

Action Taken: Rest \_\_\_\_\_ First Aid \_\_\_\_\_ Medical \_\_\_\_\_

Transported by: \_\_\_\_\_

Witnessed by: \_\_\_\_\_

Hospital's Name: \_\_\_\_\_

Treatment: \_\_\_\_\_

Comments: \_\_\_\_\_

What was the person doing at the time of the accident/incident?

Personal Protective Equipment Worn: \_\_\_\_\_

Cause of Accident/Incident: \_\_\_\_\_

What immediate action was taken to prevent recurrence? \_\_\_\_\_

Additional comments:

Employee's Signature: \_\_\_\_\_

Supervisor's Signature: \_\_\_\_\_

\_\_\_\_\_ Date

\_\_\_\_\_ Date

Safety Officer's Signature: \_\_\_\_\_

\_\_\_\_\_ Date



## 10.0 TRAINING

All personnel performing onsite intrusive tasks shall have completed formal training, which complies with 29 CFR 1910.120 (certificates of successful completion of training will be maintained in onsite job files), and shall verify on-the-job training for those tasks they are assigned to perform. All operations will be reviewed and all unfamiliar operations will be rehearsed prior to performing the actual procedure. Occupational health and safety training will be conducted by a qualified safety professional.

Orientation training will be held prior to beginning work onsite. The initial training will be supplemented, as necessary, in subsequent safety meetings. Orientation training will include:

- o Health effects and hazards of the chemicals identified or suspected to be on the Site;
- o Personal protection requirements;
- o Personal hygiene (beards, etc.);
- o Use, care, maintenance, and fitting of personal protective equipment including air purifying respirators. Training in respiratory equipment use will conform to ANSI Z88.2(1980) and 29 CFR 1910.134, which establishes the necessity, effectiveness, and limitations of respiratory equipment;
- o Decontamination procedures;
- o Accepted practices for entry, exit, and activities within specified areas of the site, including prohibition of food consumption and smoking within the exclusion and contamination reduction zones;
- o Emergency response procedures as specified in Section 9.0;
- o Review and assessment of equipment;
- o Review of job descriptions and assignments; and
- o Medical requirements.

Written documentation (Form HS-10.0A) of training will be required from all site personnel (including subcontractors) and will be maintained by the Site Safety Officer and the Landau Field Coordinator.

A Health and Safety Logbook will be maintained for recording events relating to worker health and safety. Issues discussed during safety briefings and any pertinent activities or conversations will be recorded in the log book.



## TRAINING RECORD

Employee Name: \_\_\_\_\_

Address: \_\_\_\_\_

Phone: \_\_\_\_\_

Company: \_\_\_\_\_

Training:  
(List all successfully completed Health & Safety Training)

Date	Location	Trainer	Hrs.	Title/Subject Matter
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I certify that I have successfully completed the training programs listed above.

Signature: \_\_\_\_\_

Date: \_\_\_\_\_

#### 11.0 ROUTINE HEALTH CARE AND MONITORING

A baseline medical evaluation and an annual update exam will be required for all employees, contractors, and subcontractors performing intrusive activities. Annual exams must be maintained throughout the project. Follow-up examinations are appropriate if exposures are known or suspected to have occurred. Documentation of medical evaluations (including medical clearance for respirator use) will be maintained by the Landau Field Coordinator for all site workers performing intrusive activities.



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